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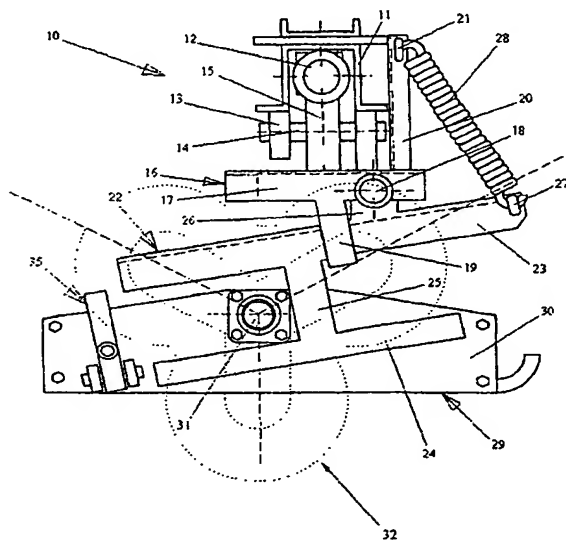
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: ROTATING LOBE PRECISION MOWER, IN PARTICULAR FOR WEEDING VINEYARDS



(57) Abstract: A precision mower (10), in particular for weeding vineyards, comprises a colum framework (11) which can be fixed laterally to a farm tractor, an enabling device designed to move the mower (10) from a rest position to a working position and vice versa, a blade-holder casing (32) connected to power-driven means (31) for the rotation of at least two blades, these blades rotating in the same direction, a temporary blocking device (35) of this casing (32) in a working position when it is not subjected to knocks from external obstacles.



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**"ROTATING LOBE PRECISION MOWER, IN PARTICULAR FOR  
WEEDING VINEYARDS"**

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**TECHNICAL FIELD**

The present invention relates to a precision mower which can be applied to farm tractors.

10 More in particular, this invention refers to a rotating lobe mower suitable for weeding land cultivated as vineyards.

This invention is applicable in the manufacturing industry of agricultural machinery in general.

15

**BACKGROUND ART**

It is known that land cultivated as vineyards, like any other cultivated land, is affected by the growth of undesired and damaging plants such as weeds and grasses in general.

20

The presence of these plants affects the condition of the vineyard as well as inevitably altering the quality of the end product.

25

Mechanical weeding machines equipped with various types of cutters according to the background art are usually employed to eliminate these weeds, thus avoiding as far as possible the use of weed-killers which would pollute both the ground and the grapes produced by the vines and, all things considered, cause a considerable decline in the quality of the wine obtained.

30

Mechanical weeding machines, used with a certain frequency, make it possible to achieve a good level of

cleaning between the rows but do not ensure effective mowing close to the stems since these could be accidentally cut.

This passive vegetation, remaining in contact with the vines, can only be removed completely by intervening manually.

#### DESCRIPTION OF THE INVENTION

The present invention proposes to provide a precision mower able to eliminate or significantly reduce the drawbacks described above.

The present invention also proposes to provide a precision mower that can be applied to any type of farm tractor.

A further aim of the present invention is to provide a precision mower that can weed land cultivated as vineyards with the possibility of adjusting the cutting height with respect to the ground.

This is achieved by means of a precision mower with the features described in the main claim.

The dependent claims describe advantageous forms of embodiment of the invention.

The precision mower according to the invention comprises:

- a column framework which can be fixed laterally to a farm tractor;
- an enabling device designed to move the mower to a working position or to a rest position;
- a shock absorber device designed to absorb the knocks when the mower is in the working position;
- a blade-holder casing hinged to a power-driven unit;

- a device for the temporary blocking of this casing in the working position when it is not subjected to knocks from external obstacles;
- at least two blades, supported by this casing, kinematically connected to the power-driven unit, which rotate in the same direction.

According to this invention the mower is equipped with a calibrating device for the adjustment of the temporary blocking of the casing.

10 The enabling device comprises a linear actuator, attached to the column framework, whose shaft presents a lever at its end designed to move the power-driven unit together with the blade-holder casing from a first rest position to a second working position.

15 In this way the exit of the linear actuator shaft raises the power-driven unit from the ground, moving it to the side of the tractor in the rest position, while the re-entry of the shaft positions the power-driven unit close to the ground and the casing presents the blades in the working position.

20 The shock absorber device comprises a stop unit, integral with the lever, to which an intermediate frame, fixed to the power-driven unit, is hinged.

25 The intermediate frame also presents means of elastic loading designed to connect it to the stop unit.

Advantageously the blade-holder casing is lobe-shaped with the number of lobes corresponding to the number of blades supported by the casing, and is also equipped with ground support means when the mower is in the working position.

30 The temporary blocking device comprises

substantially trapezoidal-shaped protuberances on the upper part of the casing in correspondence with each blade, designed to strike against a block which is integral with a cross-bar, elastically loaded by means  
5 which can be adjustable and fixed to the power-driven unit.

The precision mower comprises a device for adjusting the cutting height with respect to the ground.

When the precision mower is in the working position,  
10 the blade-holder casing is close to the ground while the blades cut the passive vegetation protruding from the ground.

The rotation of the blades in the same direction tends by inertia to make the casing rotate; it remains  
15 in position however thanks to the contrasting action exercised by the cross-bar block on a trapezoidal protuberance.

When, during operation, the casing strikes an obstacle, consisting for example of the stem of a vine,  
20 the reactive force consequent to the contact overcomes the contrasting action of the blocking device and frees the casing which in this way rotates around the obstacle, effectively removing the passive vegetation from the surrounding area.

25

#### ILLUSTRATION OF THE DRAWINGS

Other features and advantages of the invention will become evident on reading the following description of one form of embodiment of the invention, given as a non-  
30 binding example, with the help of the enclosed drawings, in which:

- figure 1 shows a plan view of a precision mower without the blade-holder casing;
- figure 2 shows a plan view of a blade-holder casing; and
- 5 - figure 3 is an enlarged front elevation of a temporary blocking device.

#### DESCRIPTION OF A FORM OF EMBODIMENT

In the figures, the reference number 10 indicates in  
10 general a mower, in the case in question a precision mower 10 which can be fitted to farm tractors.

The mower 10 comprises a column framework 11, which can be fixed to the side of a farm tractor (not shown in the drawings) preferably in an interaxial position, and  
15 to which a linear actuator 12, consisting for example of a hydraulic cylinder, is fixed.

The lower part of the framework 11, close to the ground, is equipped with a fork 13 designed to house a respective pin 14 integral with a lever 15 one end of  
20 which is fixed to the shaft of the actuator 12 and the other end to a stop unit 16.

The stop unit 16 comprises a central body 17 equipped with a hinge coupling 18, a hollow arm 19 projecting from the body 17 on the opposite side from  
25 the lever 15, a cross-bar 20 projecting from one end of the body 17 and substantially at right angles to it.

The cross-bar 20 projects towards the column framework 11 and its free end is equipped with an eyelet coupling 21.

30 The mower 10 is equipped with an intermediate frame 22, supported by the hollow arm 19 and hinged to the

coupling 18, and consists of a pair of uprights 23, 24 connected centrally by a cross-bar 25.

5 The upright 23, preferably larger than the upright 24, crosses the hollow arm 19 and presents an arm 26 which is attached to the hinged coupling 18 of the stop unit 16.

10 One end of this upright 23 also presents an eyelet coupling 27 designed to hook onto means of elastic loading, for example a helical spring 28, designed to connect the intermediate frame 22 to the stop unit 16 being attached to it by means of the eyelet coupling 21.

15 The upright 24 is designed to support a power-driven unit 29 which comprises a supporting frame 30 for a source of energy, for example a hydraulic motor 31, and for a blade-holder casing 32 (figure 2).

20 The casing 32 is designed to support, for example, three blades (not shown in the drawings) rotating around respective pins 33 and is lobe-shaped with the number of lobes corresponding to the number of blades.

The blades are connected to the hydraulic motor 31 and, in accordance with an important feature of the invention, they rotate in the same direction.

25 The blade-holder casing 32 is also equipped with ground support means, for example runners or rollers (not shown in the drawings), when the mower 10 is in the working position.

The precision mower 10 can comprise a device for adjusting the cutting height with respect to the ground (not shown in the drawings).

30 The upper part of the casing 32, facing the frame 30, presents substantially trapezoidal shaped

protuberances 34 close to each pin 33.

The mower 10 comprises a temporary blocking device 35 (figure 3) consisting of a block 36 integral with the end of a cross-bar 37, elastically loaded by a helical  
5 spring 38, hinged to the frame 30.

The spring 38 can be adjusted by means of a register bolt 39.

Each protuberance 34 has a sloping side 40 which corresponds to a bevelled edge 41 of the block 36.

10 The helical spring 38 is wound around the shank of the register bolt 39 which terminates with a punch 42 fixed to the cross-bar 37 and striking against the frame 30.

When the precision mower 10 is in the working  
15 position, the blade-holder casing 32 is close to the ground while the blades cut the passive vegetation protruding from the ground.

When operating, as indicated above, the blades rotate around their respective axes in the same  
20 direction.

The torque resultant therefore causes rotation of the casing 32 which, if it were not for the trapezoidal protuberances 34 and the blocks 36 which contrast each other and hold the casing in place, would continue to  
25 turn due to the effect of this resultant.

When the casing 32, during operation, strikes an obstacle, consisting for example of the stem of a vine, the reactive force consequent to the contact overcomes the contrasting action of the blocking device 35 freeing  
30 the casing 32 which thus rotates around the obstacle, effectively eliminating the passive vegetation from the



surrounding area.

As can be easily noted from the above description, the system foresees a supply of energy solely for the rotation of the mower blades, which is achieved by means of transmission, by belts or the like, from the hydraulic motor to the axis of the blades.

On the other hand, the energy necessary to overcome the obstacle (stem or stake) and reactivate one blade after another is supplied by two external forces, in particular the striking force against the obstacle (which overcomes the contrast with a respective trapezoidal protuberance) and the reaction torque of the blades all rotating in the same direction, advantageously in a clockwise direction (which, once the casing has been unblocked from the stop consisting of the protuberance 34, causes the casing to rotate and places the subsequent rotating blade in position).

If the mower 10 strikes external obstacles, the intermediate frame 22 oscillates around the hinged coupling 18 of the unit 16 responding elastically thanks to the action of the helical spring 28 and being limited in range by the hollow arm 19 which acts as a stop for the movement of the upright 23.

From the above description it can be seen that the forces involved are extremely modest, and the stress on the shaft around which the mower rotates and on the cross-bar spring is such as to ensure long-term good functioning of the system.

The parts most subject to wear are the trapezoidal protuberances 34 and the edges of the blocks 36 attached to the cross-bar 37.

As a design choice, instead of being welded these elements can therefore be fixed with a dovetail or similar system, allowing their replacement when they become worn.

5       The invention is described above with reference to a preferred form of embodiment.

It is nevertheless clear that the invention is susceptible to numerous variations in the framework of technical equivalents.

## CLAIMS

1. A precision mower (10) characterised in that it comprises:

- a column framework (11) which can be fixed  
5 laterally to a farm tractor;
- an enabling device designed to move the mower (10) from a rest position to a working position and vice versa;
- a blade-holder casing (32) connected to power-  
10 driven means (31) for the rotation of at least two blades, these blades rotating in the same direction;
- a temporary blocking device (35) of this casing (32) in a working position when it is not  
15 subjected to knocks from external obstacles.

2. A mower (10) according to claim 1, characterised in that the enabling device comprises a linear actuator (12), attached to the column framework (11), whose shaft is constrained at one end to a lever (15)  
20 designed to move a power-driven unit (29) together with the blade-holder casing (32).

3. A mower (10) according to anyone of the preceding claims, characterised in that the temporary blocking device (35) comprises protuberances (34), on the  
25 upper part of the casing (32) in correspondence with each blade, designed to strike against a block (36) integral with the end of a cross-bar (37), elastically loaded and constrained to the power-driven unit (29).

30 4. A mower (10) according to claim 3, characterised in that it comprises a calibration device for the

adjustment of this temporary blocking device (35).

5. A mower (10) according to anyone of the preceding claims, characterised in that it comprises a device for adjusting the cutting height with respect to the ground.

6. A mower (10) according to anyone of the preceding claims, characterised in that the blade-holder casing (32) is lobe-shaped with the number of lobes corresponding to the number of blades.

10 7. A mower (10) according to anyone of the preceding claims, characterised in that the blade-holder casing (32) is equipped with ground support means when the mower (10) is in the working position.

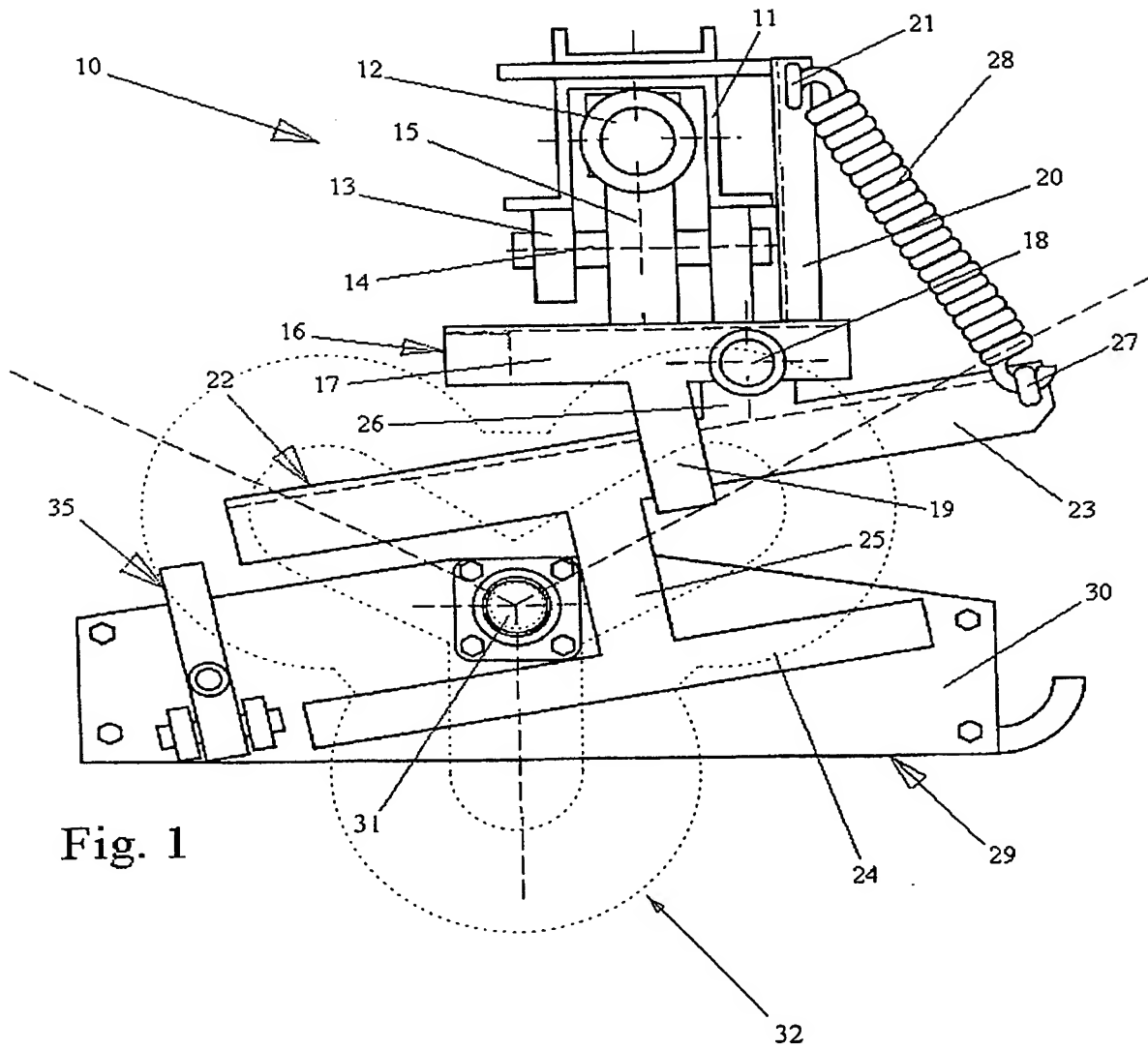
15 8. A mower (10) according to claim 7, characterised in that these ground support means consist of runners or rollers.

20 9. A mower (10) according to anyone of the preceding claims, characterised in that it also comprises a shock-absorber device designed to absorb knocks when the mower (10) is in the working position.

25 10. A mower (10) according to claim 9, characterised in that this shock-absorber device comprises a stop unit (16), integral with the lever (15), to which an intermediate frame (22) fixed to the power-driven unit (29) is fixed.

30 11. A mower (10) according to claim 10, characterised in that the intermediate frame presents means of elastic loading designed to connect it to the stop unit (16).

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Fig. 2

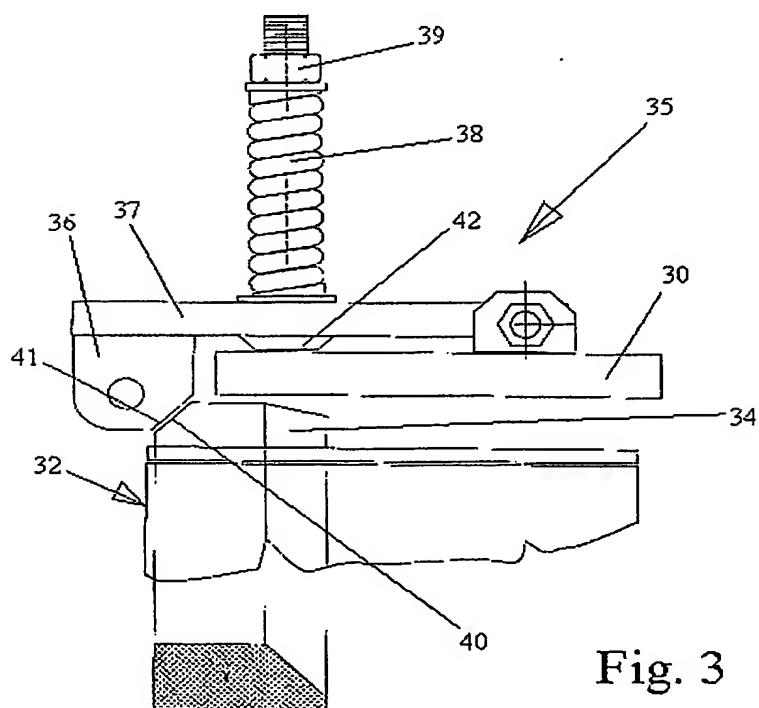
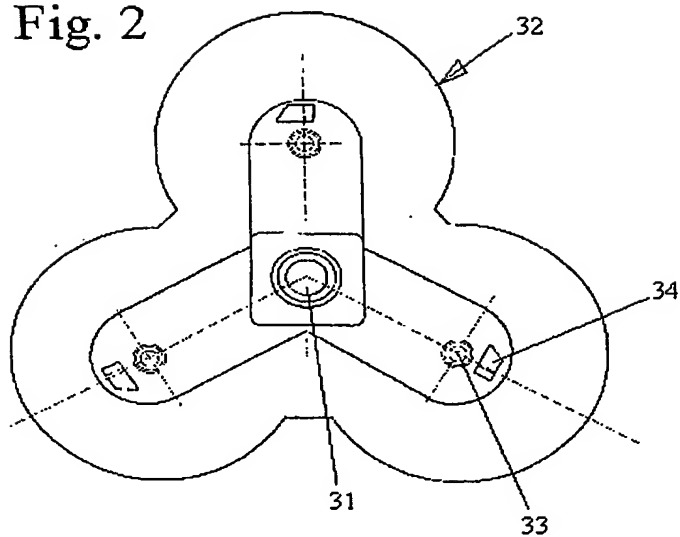


Fig. 3

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/IT 03/00013

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 A01D34/86

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, EPO-Internal, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 526 083 A (WATSON JOHN F ET AL) 1 September 1970 (1970-09-01) column 2, line 58 -column 5, line 71; figures 1-7	1,2,6-9
X	US 2 838 901 A (DAVIS HERBERT W) 17 June 1958 (1958-06-17) the whole document	1,6,7
X	AT 389 031 B (ALLG MASCHINENENTWICKLUNGS GES) 10 October 1989 (1989-10-10) page 1, line 56 -page 2, line 43; figures 1-3	1,6
A	DE 43 05 135 A (FIEDLER MASCHINENBAU UND TECHN) 6 October 1994 (1994-10-06) the whole document	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents :

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- \*&\* document member of the same patent family

Date of the actual completion of the international search

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## INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 3526083	A	01-09-1970	NONE	
US 2838901	A	17-06-1958	NONE	
AT 389031	B	10-10-1989	AT 237384 A	15-03-1989
DE 4305135	A	06-10-1994	DE 4305135 A1	06-10-1994